SHARP Service Manual

MODEL FX-209HA

SPECIFICATIONS

Frequency Range
- AM ..... 520 ~ 1620kHz
- FM ..... 87.6 ~ 108MHz

Intermediate Frequency
- AM 455kHz
- FM 10.7MHz

Power Output
- Undistorted 200mW
- Maximum 350mW

Speaker ..... 2-3/8" (6cm) Permanent Dynamic Speaker, 8 ohms

Power Source ..... DC 6V ("AA" size or UM-3/SUM-3 battery x 4)

Dimensions ..... 5"(H) x 2-15/16"(W) x 1-3/8"(D) [127(H) x 75(W) x 35(D) mm]

Weight ..... 0.59 lbs. (270 grams)

TRANSISTOR COMPLEMENT

Q1	9016F	FM RF Amplifier
Q2	9018E	FM/AM Converter
Q3	9012HG	AFC
Q4	9016F	1st IF Amplifier
Q5	9018F	2nd IF Amplifier
Q6	9014B	Audio Amplifier
Q7	9015B	Audio Driver
Q8, Q9	9012HG x 2	Audio Output (Matched Pair)

GENERAL DESCRIPTION

The circuitry used in this 2 band (AM/FM) superheterodyne system portable radio incorporates 9 transistors and 5 diodes.
A ferrite bar antenna feeds the AM broadcasting signal to the AM converter (Q2), 2 IF amplifiers and a diode detector.
A telescopic rod antenna feeds the FM broadcasting to the FM RF amplifier (Q1), FM converter (Q2), 2 IF amplifiers and FM detector (2 diodes).
The audio signal passes through the 4 transistors audio amplifier circuit.
An AM AGC voltage is fed back to the 1st IF amplifier.
An AFC voltage is fed back to the FM converter.

CHASSIS REMOVAL

(1) Remove the back cabinet.
(2) As the printed circuit board is fixed into the slit of the cabinet, push open both sides of the cabinet and lift up the printed circuit board. Then the printed circuit board can be removed.

SHARP CORPORATION OSAKA, JAPAN

GENERAL ALIGNMENT INSTRUCTIONS

Should it become necessary at any time to check the alignment of this receiver, proceed as follows ;

1) Connect an output meter across the speaker voice coil lugs.
2) Set the volume control at maximum.
3) Attenuate the signals from the generator enough to swing the most sensitive range of the output meter.
4) Use a non-metallic alignment tool.
5) Repeat adjustments to insure good results.

AM ALIGNMENT CHART

Set the Band Selector Switch at "AM" position.

STEP	BAND	SIGNAL GENERATOR		RECEIVER		ADJUSTMENT
		CONNECTION TO RECEIVER	INPUT SIGNAL FREQUENCY	DIAL SETTING	REMARKS	
1	IF	Connect signal generator through a 10K ohm dummy to the antenna tuning capacitor. Ground lead to the receiver chassis.	Exactly 455 kHz (400 Hz, 30%, AM modulated.)	Tuning gang fully open. (minimum capacity)	Adjust for maximum output on speaker voice coil lugs.	T5 T6 T7
2	Band Coverage	Use radiation loop. Loop of several turns of wire, or place generator lead close to receiver for adequate signal pickup. Connect generator output to one end of this wire.	Exactly 510 kHz (400Hz, 30%, AM modulated.)	Tuning gang fully closed. (maximum capacity)	Same as step 1	Adjust the MW oscillator coil L6.
3	Band Coverage	Same as step 2	Exactly 1650 kHz (400 Hz, 30%, AM modulated.)	Tuning gang fully open. (minimum capacity)	Same as step 1	Adjust the MW oscillator trimmer C8.
4	Tracking	Same as step 2	Exactly 600 kHz (400 Hz, 30%, AM modulated.)	600 kHz	Same as step 1	Adjust the MW antenna coil L5. (See NOTE A.)
5	Tracking	Same as step 2	Exactly 1400 kHz (400 Hz, 30%, AM modulated.)	1400 kHz	Same as step 1	Adjust the MW antenna trimmer (C7). (See NOTE A.)
6	Repeat steps 2 and 5 until no further improvement can be made.					

NOTE A

Check the alignment of the receiver antenna coil by bringing a piece of ferrite (such as a coil slug) near the antenna loop stick, then a piece of brass. If ferrite increases output, loop requires more inductance. If brass increases output, loop requires less inductance. Change loop inductance by sliding the bobbin toward the center of ferrite core to increase inductance, or away to decrease inductance.

THE INSTRUCTION OF FREQUENCY ADJUSTMENT

In order to comply with FTZ rule : Nr. 358 S757, please fix the low end of dial frequency (87.5 MHz) and the high end of dial frequency (107.9MHz) on FM band, by adjusting oscillation coil (L4) and oscillation trimmer (C6), respectively, as illustrated in Figure 4.

FM ALIGNMENT CHART

Set the Band Selector switch at "FM" position.

STEP	TEST STAGE	SIGNAL GENERATOR		RECEIVER		ADJUSTMENT
		CONNECTION TO RECEIVER	INPUT SIGNAL FREQUENCY	DIAL SETTING	REMARKS	
1	IF	Connect signal generator through a 5PF capacitor to test point [TP-3] Connect generator ground lead to the receiver chassis.	Exactly 10.7 MHz. (400 Hz, 30%, FM modulated)	Tuning gang fully closed. (maximum capacity)	Connect VTVM between test point [TP-6] and chassis ground.	Detune T3, T4 Tune T1, and T2 for maximum indication
2	Ratio Detector	Same as step 1.	Exactly 10.7 MHz. (Unmodulated)	Same as step 1.	See NOTE B.	See NOTE B.
3	Band Coverage	Connect signal generator through a dummy, including output impedance of signal generator to the FM antenna. (Refer to Figure 1) Ground lead of generator connected to the receiver chassis.	Exactly 88 MHz. (400 Hz, 30%, FM modulated)	Tuning gang fully closed. (maximum capacity)	Adjust for maximum output speaker voice coil lugs.	Adjust the FM oscillator coil L4.
4	Band Coverage	Same as step 3.	Exactly 106 MHz. (400 Hz, 30%, FM modulated)	Tuning gang fully open. (minimum capacity)	Same as step 3.	Adjust the FM oscillator trimmer C6.
5	Tracking	Same as step 3.	Exactly 90 MHz. (400Hz, 30%, FM modualted)	90 MHz	Same as step 3.	Adjust the FM RF coil L2.
6	Tracking	Same as step 3.	Exactly 104 MHz (400 Hz, 30%, FM modulated)	104 MHz	Same as step 3.	Adjust the FM RF trimmer C5.
7		Repeat steps 3, 4, 5 and 6 until no further improvement can be made.				

NOTE B

1) Connect VTVM (0.1 volts range DC scale) between test point [TP4] and chassis ground.
2) Adjust T4 for 0 volt on VTVM.
3) Change signal generator frequency 10.7 MHz + 100 kHz and −100 kHz approximately.
4) Adjust T3 for balanced peaks. Peak separation should be approximately 200 kHz.

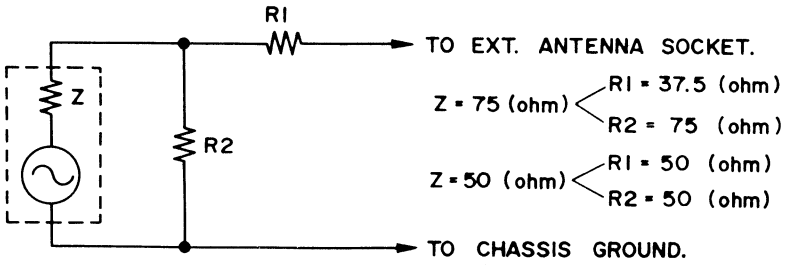
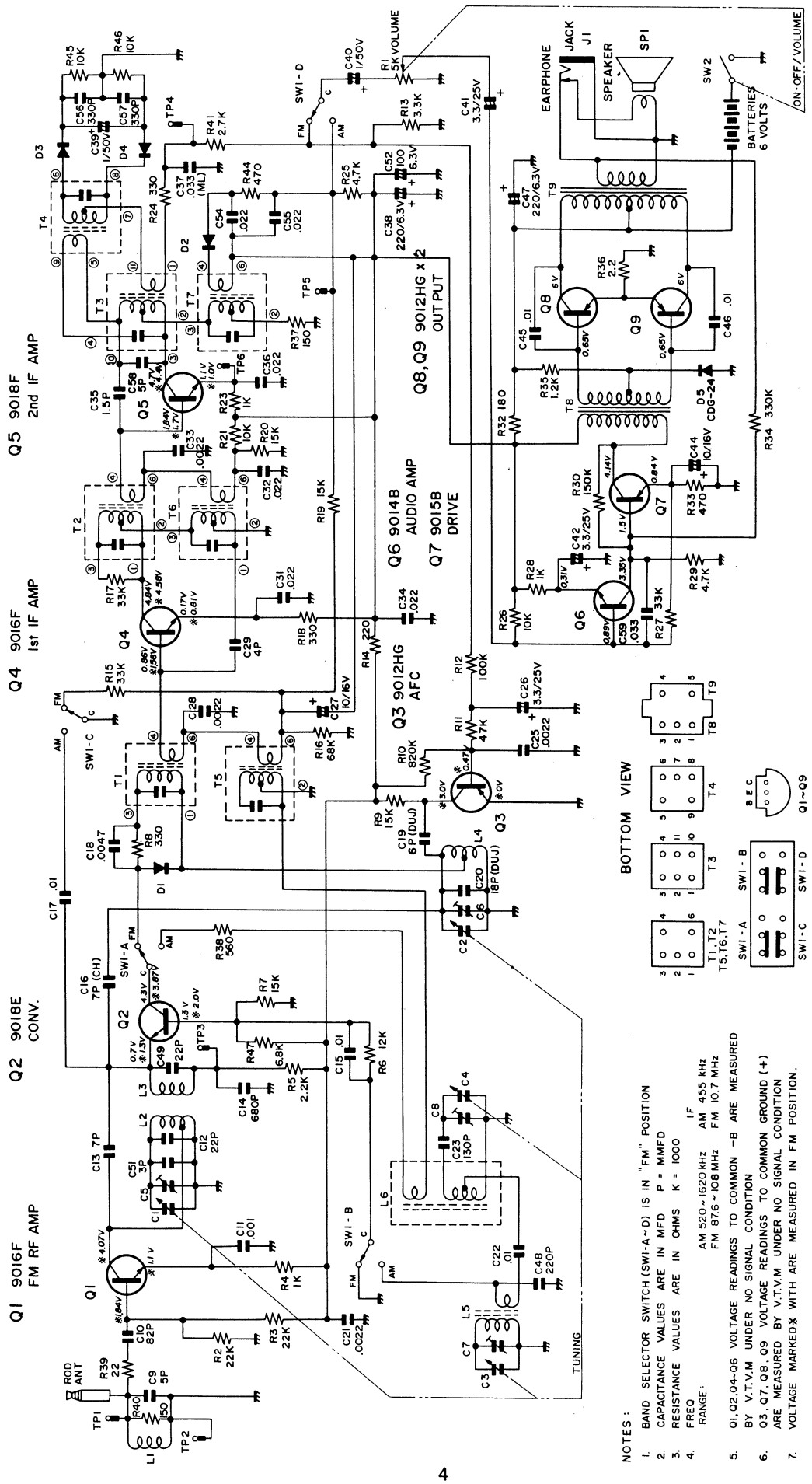


Figure 1 FM DUMMY


Q1 9016F FM RF AMP
Q2 9018E CONV.
Q4 9016F 1st IF AMP
Q5 9018F 2nd IF AMP
Q6 9014B AUDIO AMP
Q7 9015B DRIVE
Q8,Q9 9012HG x 2 OUT PUT
Q3 9012HG AFC
EARPHONE JACK J1
SPEAKER SP1
SW2 ON-OFF/VOLUME
BATTERIES 6 VOLTS
R1 5K VOLUME
TUNING
ROD ANT
BOTTOM VIEW
SW1-A SW1-B SW1-C SW1-D
T1,T2 T5,T6,T7 T3 T4 T8 T9
Q1~Q9
NOTES :
1. BAND SELECTOR SWITCH (SW1-A~D) IS IN "FM" POSITION
2. CAPACITANCE VALUES ARE IN MFD P = MMFD
3. RESISTANCE VALUES ARE IN OHMS K = 1000
4. FREQ IF
RANGE : AM 520~1620 KHz AM 455 kHz
FM 87.6~108 MHz FM 10.7 MHz
5. Q1,Q2,Q4-Q6 VOLTAGE READINGS TO COMMON -B ARE MEASURED BY V.T.V.M UNDER NO SIGNAL CONDITION
6. Q3,Q7,Q8,Q9 VOLTAGE READINGS TO COMMON GROUND (+) ARE MEASURED BY V.T.V.M UNDER NO SIGNAL CONDITION
7. VOLTAGE MARKED※ WITH ARE MEASURED IN FM POSITION.

(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 2 SCHEMATIC DIAGRAM

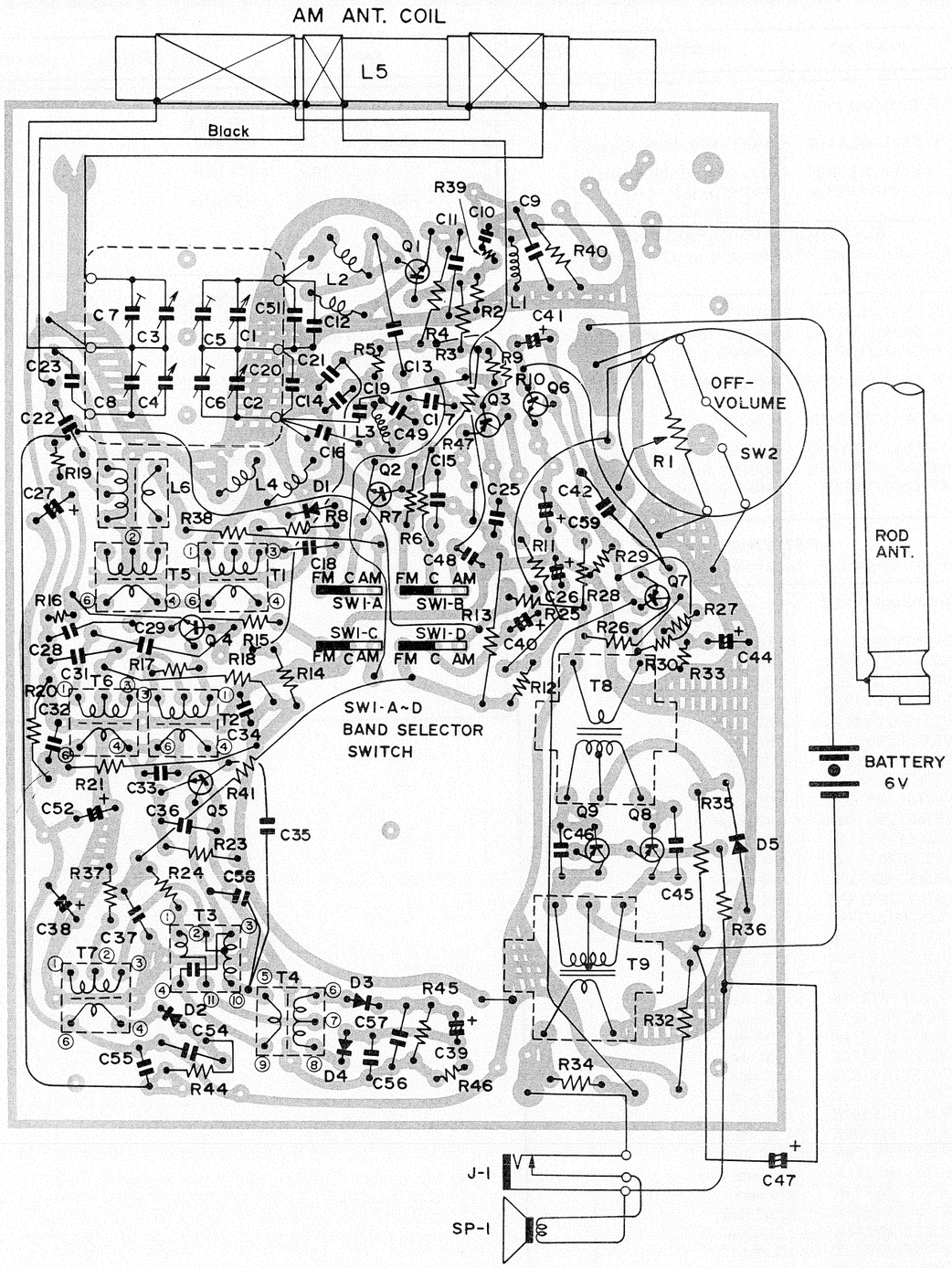


Figure 3 WIRING SIDE OF P.W. BOARD

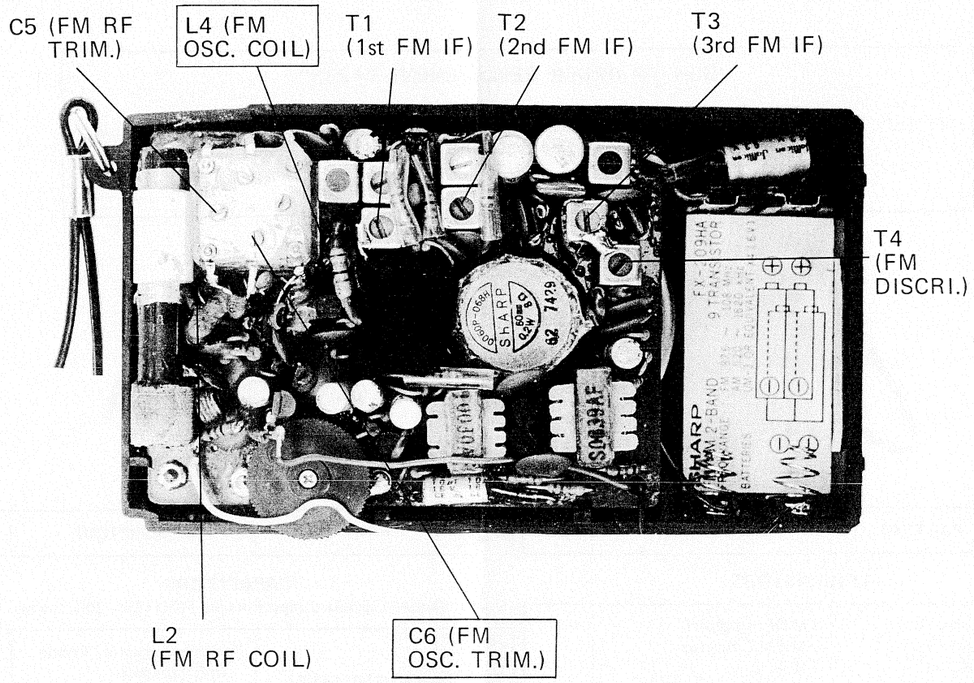


Figure 4 FM ALIGNMENT POINTS

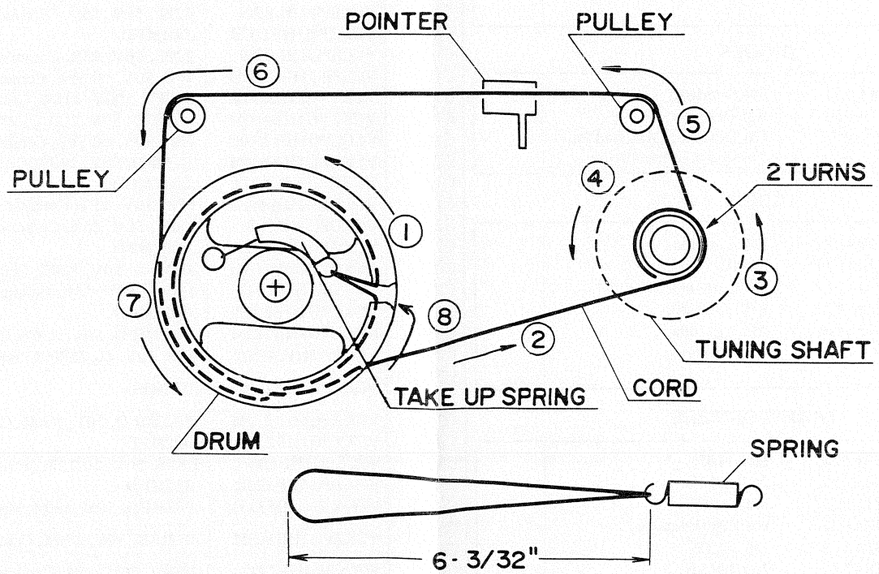


Figure 5 DIAL CORD STRINGING

MODEL
FX-209HA

SHARP

PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER 2. REF. NO.
3. PART NO. 4. DESCRIPTION

MODEL FX-209HA

TRANSISTORS

REF. NO.	PART NO.	DESCRIPTION	CODE
Q1	VS9016-F///-1	FM RF Amplifier	
Q2	VS9018-E///-1	AM/FM Converter	
Q3	VS9012HG///-1	FM AFC	
Q4	VS9016-F///-1	1st AM/FM IF Amplifier	
Q5	VS9018-F///-1	2nd AM/FM IF Amplifier	
Q6	VS9014-B///-1	Audio Amplifier	
Q7	VS9015-B///-1	Audio Driver	
Q8, Q9	VS9012HG///-1	Audio Output (Matched Pair)	

DIODES

REF. NO.	PART NO.	DESCRIPTION	CODE
D1	VHD1N34A///-1	FM Overload	
D2	VHD1N34A///-1	AM Detector	
D3, D4	VHD1N60////-3	FM Detector (Matched Pair)	
D5	VHVCDG24///-1	Thermal Compensation	

COILS

REF. NO.	PART NO.	DESCRIPTION	CODE
L1	RCILR0088AFZZ	FM Antenna	
L2	RCILR0112AFZZ	FM RF	
L3	RCILC0018AFZZ	FM Emitter Choke	
L4	RCILR0089AFZZ	FM Oscillator	
L5	RCILA0193AFLA	AM Antenna	
L6	RCILB0269AFZZ	AM Oscillator	

TRANSFORMERS

REF. NO.	PART NO.	DESCRIPTION	CODE
T1	RCILI0142AFZZ	1st FM IF	
T2	RCILI0150AFZZ	2nd FM IF	
T3	RCILI0151AFZZ	3rd FM IF	
T4	RCILI0143AFZZ	FM Discriminator	
T5	RCILI0141AFZZ	1st AM IF	
T6	RCILI0148AFZZ	2nd AM IF	
T7	RCILI0149AFZZ	3rd AM IF	
T8	RTRNI0030AFZZ	Audio Driver	
T9	RTRNS0839AFZZ	Audio Output	

CAPACITORS

(Unless otherwise specified capacitors are 50V, +80 −20%, Ceramic Type.)

REF. NO.	PART NO.	DESCRIPTION	CODE
C1, C2, C3, C4, C5, C6, C7, C8	RVC-R0014AFZZ	Variable Capacitor, Tuning with Trimmers C5: FM RF Trimmer C6: FM Oscillator Trimmer C7: AM Antenna Trimmer C8: AM Oscillator Trimmer	
C9	VCCSPU1HL5R0C	5PF, 50V, ±0.25PF, Ceramic	
C10	VCCSPU1HL820J	82PF, 50V, ±5%, Ceramic	
C11	VCKZPU1HF102Z	.001MFD	
C12	VCCSPU1HL220J	22PF, 50V, ±5%, Ceramic	
C13	VCCSPU1HL7R0D	7PF, 50V, ±0.5PF, Ceramic	
C14	VCKYPU2HB681K	680PF, 500V, ±10%, Ceramic	
C15	VCKZPU1HB103M	.01MFD, 50V, ±20%, Ceramic	
C16	VCCCPU1HH7R0D	7PF, 50V, ±0.5PF, Ceramic	
C17	VCKZPU1HB103M	.01MFD, 50V, ±20%, Ceramic	
C18	VCKZPU1HF472Z	.0047MFD	
C19	VCCUPU1HJ6R0J	6PF, 50V, ±5%, Ceramic	
C20	VCCUPU1HJ180J	18PF, 50V, ±5%, Ceramic	
C21	VCKZPU1HF222Z	.0022MFD	
C22	VCKZPU1HB103M	.01MFD, 50V, ±20%, Ceramic	
C23	VCCSBU1HL131J	130PF, 50V, ±5%, Ceramic	
C25	VCKZPU1HF222Z	.0022MFD	
C28	VCKZPU1HB222M	.0022MFD, 50V, ±20%, Ceramic	
C29	VCCSPU1HL4R0C	4PF, 50V, ±0.25PF, Ceramic	
C31, C32	VCKZPU1HF223Z	.022MFD	
C33	VCKZPU1HB222M	.0022MFD, 50V, ±20%, Ceramic	
C34	VCKZPU1HF223Z	.022MFD	
C35	VCCSPU1HL1R5C	1.5PF, 50V, ±0.25PF, Ceramic	
C36	VCKZPU1HF223Z	.022MFD	
C37	VCQYKU1HM333M	.033MFD, 50V, ±20%, Mylar	
C45, C46	VCKZPU1HB103M	.01MFD, 50V, ±20%, Ceramic	
C48	VCCSBU1HL221J	220PF, 50V, ±5%, Ceramic	
C49	VCCSPU1HL220J	22PF, 50V, ±5%, Ceramic	
C51	VCCSPU1HL3R0C	3PF, 50V, ±0.25PF, Ceramic	
C54, C55	VCKZPU1HF223Z	.022MFD	
C56, C57	VCCSBU1HL331K	330PF, 50V, ±10%, Ceramic	
C58	VCCSPU1HL5R0D	5PF, 50V, ±0.5PF, Ceramic	
C59	VCKZPU1HF333P	.033MFD, 50V, +100 −0%, Ceramic	

ELECTROLYTIC CAPACITORS

(Unless otherwise specified capacitors are 25V, +150 −10%, Electrolytic Type.)

REF. NO.	PART NO.	DESCRIPTION	CODE
C26	VCEAAU1EW335R	3.3MFD	
C27	VCEAAU1CW106Q	10MFD, 16V, +100 −10%	
C38	VCEAAU0XW227Q	220MFD, 6.3V	
C39, C40	VCEAAU1HW105R	1MFD, 50V, +150 −10%	
C41, C42	VCEAAU1EW335R	3.3MFD	
C44	VCEAAU1CW106Q	10MFD, 16V, +100 −10%	
C47	VCEAAU0XW227Q	220MFD, 6.3V, +100 −10%	
C52	RC-EZ0037AFZZ	100MFD, 6.3V	

RESISTORS

(Unless otherwise specified resistors are 1/8W, ±10%, Carbon Type.)

REF. NO.	PART NO.	DESCRIPTION	CODE
R1/SW2	RVR-D0089AFZZ	5K ohm, Volume Control with OFF-ON Switch	
R2, R3	VRD-SU2BY223K	22K ohm	
R4	VRD-SU2BY102K	1K ohm	
R5	VRD-ST2BY222K	2.2K ohm	
R6	VRD-SU2BY123K	12K ohm	
R7	VRD-SU2BY153K	15K ohm	
R8	VRD-SU2BY331K	330 ohm	
R9	VRD-SU2BY153K	15K ohm	
R10	VRD-ST2BY824K	820K ohm	
R11	VRD-SU2BY473K	47K ohm	
R12	VRD-SU2BY104K	100K ohm	
R13	VRD-ST2BY332K	3.3K ohm	
R14	VRD-SU2BY221K	220 ohm	
R15	VRD-ST2BY333K	33K ohm	
R16	VRD-SU2BY683K	68K ohm	
R17	VRD-SU2BY333K	33K ohm	
R18	VRD-ST2BY331K	330 ohm	
R19	VRD-SU2BY153K	15K ohm	
R20	VRD-SU2BY153K	15K ohm	
R21	VRD-ST2BY103K	10K ohm	
R23	VRD-ST2BY102K	1K ohm	
R24	VRD-ST2BY331K	330 ohm	
R25	VRD-ST2BY472K	4.7K ohm	
R26	VRD-ST2BY103K	10K ohm	
R27	VRD-SU2BY333K	33K ohm	
R28	VRD-SU2BY102K	1K ohm	
R29	VRD-SU2BY472K	4.7K ohm	
R30	VRD-ST2BY154K	150K ohm	
R32	VRD-ST2BY181K	180 ohm	
R33	VRD-SU2BY471K	470 ohm	
R34	VRD-SU2BY334K	330K ohm	
R35	VRD-ST2BY122K	1.2K ohm	
R36	VRD-ST2BY2R2K	2.2 ohm	
R37	VRD-SU2BY151K	150 ohm	
R38	VRD-ST2BY561K	560 ohm	
R39	VRD-ST2BY220K	22 ohm	
R40	VRD-ST2BY151K	150 ohm	
R41	VRD-ST2BY272K	2.7K ohm	
R44	VRD-SU2BY471K	470 ohm	
R45, R46	VRD-SU2BY103K	10K ohm	
R47	VRD-ST2BY682K	6.8K ohm	

MISCELLANEOUS

REF. NO.	PART NO.	DESCRIPTION	CODE
	GCABA0369AFS	Cabinet, Front	
	GCABB0370AFS	Cabinet, Back	
	GFTAB1089AFS	Cover, Battery	
	HPNLD1097AFS	Panel	
	HSSND0084AFS	Pointer, Dial	
	HDALM0104AFS	Dial	
	JKNBN0021AFS	Knob, Tuning	
	JKNBK0114AFS	Knob, Volume Control	
	NDRM-0070AFZZ	Drum, Dial Cord	
	UBNDT0003AFS	Belt, Carrying	
	VSP0060P-068H	Speaker	
SP1	QPWBF0213AFZZ	Printed Wiring Board	
	RPHOE0021AFZZ	Earphone	
	QJAKA0025AGS	Jack, Earphone	
J1			
SW1-A ∼D	QSW-S0052AFZZ	Switch, Band Selector	
	QANTR0016AFFC	Antenna, Telescopic	

A2511-4.4MH
Printed in Japan